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グローバルCOE「統合物質科学」
低温物質科学研究センター
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Low Temperature & Materials Sciences
Kyoto University

日 時: 平成22年 11月29日（月） 13:30 ～15:00

場 所: 京都大学工学部物理系校舎 212講義室（2階）

Scanning tunnelling microscopy beyond imaging: magneto-electric coupling and single molecule spintronics

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Magneto-electric coupling (MEC), i.e. the possibility to influence the magnetic state of a solid by an electric field, offers new pathways for information storage and might overcome both the current density and speed limitations of conventional magnetic writing on hard discs. So far, significant MEC was only observed in insulators and not in metals, as in metals the electric field is efficiently screened by surface charges. In this work we show that exactly this formation of surface charges leads to very strong MEC on metallic surfaces and that MEC can be used in simple iron films to write, store and read magnetic information on the nanometer scale with the help of the local electric field underneath the tip of a scanning tunnelling microscope (STM). The discovery of the giant magneto resistance (GMR) was an important moment for modern physics. Due to its various applications in memory devices, it was widely studied in numerous different systems. Here we measured the GMR across a single molecule using spin-polarized scanning tunnelling microscopy (Sp-STM), where a magnetic substrate serves as one of the electrodes and the magnetic tip as the other. The conductances of the molecules were measured by mechanically contacting the molecules with the tip of the STM in a controlled way and a GMR effect of 60% in combination with a high conductance of 0.3 G0 could be obtained.

Wulf Wulfhekel教授は，表面科学の専門家としてご活躍されている先生で，特に原子分解能を有する走査型トンネル顕微鏡を用いて数多くの研究を展開されています．
今回，Wulfhekel教授にグローバルCOE「統合物質科学」Lecturerとして来日して頂きました，この機会にGCOE「統合物質科学」と低温物質科学研究センターとの共催によるセミナーを行ない，最近のご研究に関してお話しいただくことに致しました．
多数の皆様のご来聴をお願い致します．

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